No. 8600083

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Busch Agricultural Resources, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IT UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

BARLEY

'B1601'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington, D. C. *this* 31st *day of* December *in the year of our Lord one thousand nine hundred and ninety.*

Attest:

Kenneth H. Evans
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Clayton Yeutter
Secretary of Agriculture

APPROVAL EXPIRES 4-30-85

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

FORM APPROVED: OMB NO. 0581-0055

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION	3. VARIETY NAME
Busch Agricultural Resouces, Inc.	6B80-761	B1601

4. ADDRESS (Street and No. or R.F.D. No., City, State, and Zip Code)	5. PHONE (Include area code)	FOR OFFICIAL USE ONLY
806 N. 2nd Street Berthoud, Colorado 80513	(303) 532-3721	PVPO NUMBER **8600083**

6. GENUS AND SPECIES NAME	7. FAMILY NAME (Botanical)	FILING
Hordeum vulgare L.	Gramineae	DATE March 17, 1986 TIME 10:00 ☑ A.M. ☐ P.M.

8. KIND NAME	9. DATE OF DETERMINATION	FEES RECEIVED
Spring Barley	March 1, 1978 March 1, 1980	AMOUNT FOR FILING $ 1800.00 DATE March 17, 1986 AMOUNT FOR CERTIFICATE $ 200.00 DATE Dec 21, 1990

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)*

Corporation

11. IF INCORPORATED, GIVE STATE OF INCORPORATION	12. DATE OF INCORPORATION
Delaware	1-1-81

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS

Dr. Melvern K. Anderson
Busch Agricultural Resouces, Inc.
806 N. 2nd Street
Berthoud, Colorado 80513 (303) 532-3721

or

C. Bruns
Nickerson American Plant Breeders Inc.
806 N. 2nd Street, Berthoud CO 80513
PHONE *(Include area code)*:

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED

a. ☒ Exhibit A, Origin and Breeding History of the Variety *(See Section 52 of the Plant Variety Protection Act.)*
b. ☒ Exhibit B, Novelty Statement.
c. ☒ Exhibit C, Objective Description of Variety *(Request form from Plant Variety Protection Office.)*
d. ☒ Exhibit D, Additional Description of Variety.
e. ☒ Exhibit E, Statement of the Basis of Applicant's Ownership. Exhibit F. Quality Data

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act.)* ☒ Yes *(If "Yes," answer items 16 and 17 below)* ☐ No

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?	17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
☒ Yes ☐ No	☒ Foundation ☒ Registered ☒ Certified

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?

☐ Yes *(If "Yes," give date)*

☒ No

19. HAS THE VARIETY BEEN RELEASED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?

☐ Yes *(If "Yes," give names of countries and dates)*

☒ No

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT	DATE
Melvern K Anderson, Busch Ag. Res.	2-26-86
SIGNATURE OF APPLICANT	DATE

FORM WA-470 (7-84) (Edition of 3-84 is obsolete.)

1

EXHIBIT A

Origin and Breeding History of B1601 (6B80-761; Busch-2; B1601)

Pedigree: M-30/6B75-1374B

Date of Cross: The cross was made in the fall 1977 greenhouse; the F1 was grown in the spring 1978 greenhouse to produce F2 seed.

History: F2 plants were grown at Hunter, North Dakota in 1978. A single seed from an F2 head selection was advanced by single seed descent in the fall 1978 greenhouse. An F4 head-row was selected in Crookston, Minnesota in 1979. Malting quality prediction tests on remnant F4 seed assisted in the selection of an F5 seed increase plot in Yuma, Arizona for yield testing an F2 derived F6 bulk at Hunter and St. Thomas, North Dakota in 1980. This line advanced to second year yield trials in 1981. In 1982 300 head selections were made to initiate purification and multiplication. These 300 head-rows were grown in 1983 and 217 were selected to serve as bulk breeder seed.

This seed served as the pure seed source and yield trial source. B1601 was tested in yield trials from 1980-1984 at Moorhead and Climax, Minnesota and Hunter and St. Thomas, North Dakota. Additional test sites in 1985 were at Borup and Stephen, Minnesota. B1601 has been tested as Busch-2 in the Mississippi Valley Regional Nursery since 1983. B1601 has been tested in state barley breeding programs in North Dakota and Wisconsin.

Purification was initiated in 1983. Three hundred head-rows were grown at our Berthoud, Colorado location and 67 rows were discarded. These selected head-rows were also grown again in 1985. Selected head-rows were harvested to form Breeder seed. Breeder seed was increased in 1984 at Berthoud and Foundation seed was produced during the winter of 1984-85 at Yuma, Arizona and in 1985 at Climax, Minnesota. Registered seed was also produced in 1985 in Minnesota and North Dakota.

Future head-rows will be grown as necessary to constitute breeder seed. All seed production fields to date have been stable and uniform.

EXHIBIT B.

NOVELTY STATEMENT

B1601 is most similar to the spring barley variety "Robust", however it can be distinguished by the following morphological characteristics:

- B1601 has rough lemma awns. Robust is a smooth awned spring barley.
- B1601 has long hairs on the rachilla. Robust has short hairs on the rachilla.
- B1601 also has higher levels of alpha amylase than Robust. This enzyme is instrumental in changing starches to fermentable sugars and is evaluated very carefully, (see following page - quality table).

EXHIBIT B - B1601

MALTING QUALITY SUMMARY, 1982-1985

Variety	Kernel Plumpness Over 6/64 %	Protein Content			Malt Extract %	Diastatic Power	Alpha Amylase
		Malt %	Wort %	Soluble Protein %			
B1601	74	12.9	4.1	32	76.9	132	33
Morex	66	13.2	4.4	33	77.5	127	37
Robust	76	13.0	4.0	31	76.9	121	22

STATISTICAL TABLE FOR ALPHA AMYLASE

Variety	Mean	$S\bar{d}$	$\bar{d}$	n	t
B1601	33	2.2433	7.69	10	3.428**
Robust	22				

** The probability that the difference in the means of alpha amylase activity is significantly different at the 1% level.

STATISTICAL TABLE FOR HEADING DATE

Variety	Mean	$S\bar{d}$	$\bar{d}$	n	t
B1601	173.4	0.1712	2.3	39	13.435**
Robust	175.7				

** The probability that the difference in the means of heading date is significantly different at the 1% level.

B1601

FORM APPROVED: OMB NO. 40-R3822

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, POULTRY, GRAIN & SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Barley)

OBJECTIVE DESCRIPTION OF VARIETY

BARLEY *(HORDEUM VULGARE)*

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S)

Busch Agricultural Resources, Inc.

ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*

806 N. 2nd Street
Berthoud, CO 80513

FOR OFFICIAL USE ONLY

PVPO NUMBER: 8600083

VARIETY NAME OR TEMPORARY DESIGNATION: B1601

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (i.e. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

1. GROWTH HABIT:

[1] 1 = SPRING 2 = FACULTATIVE WINTER 3 = WINTER [3] Early Growth: 1 = PROSTRATE 2 = SEMIPROSTRATE 3 = ERECT

2. MATURITY (50% Flowering):

[2] 1 = EARLY (California Mariout) 2 = MIDSEASON (Betzes) 3 = LATE (Frontier)

Equal to Glenn (8.)

[2] No. of days *Earlier* than ..... [9]
[---] No. of days *Later* than .....
1 = BETZES 2 = CALIFORNIA MARIOUT 3 = CONQUEST 4 = DICKSON 5 = PIROLINE 6 = PRIMUS 7 = UNITAN 8=Glenn 9=Robust

3. PLANT HEIGHT (From soil level to top of head):

[4] 1 = SEMIDWARF 2 = SHORT (California Mariout) 3 = MEDIUM TALL (Betzes) 4 = TALL (Conquest)

Equal to Morex (8)

[ ][ ] Cm. *Shorter* than .....
[ ][ ] Cm. *Taller* than .....
1 = BETZES 2 = CALIFORNIA MARIOUT 3 = CONQUEST 4 = DICKSON 5 = PIROLINE 6 = PRIMUS 7 = UNITAN 8=Morex

4. STEM:

[3] Exertion *(Flag to spike at maturity)*: 1 = 0 - 3 cm. 2 = 3 - 10 cm. 3 = 10 - 15 cm.

[1] Anthocyanin: 1 = ABSENT 2 = PRESENT

[0][5] NO. OF NODES (Originating from node above ground)

[2] Collar Shape: 1 = CLOSED 2 = V-SHAPED 3 = OPEN 4 = MODIFIED CLOSED OR OPEN

[1] Shape of Neck: 1 = STRAIGHT 2 = SNAKY 3 = OTHER (Specify) _____

5. LEAF:

[1] Basal leaf sheath *(seedling)*: 1 = GLABROUS 2 = PUBESCENT

[3] Position of flag leaf *(at boot stage)*: 1 = DROOPING 2 = UPRIGHT 3=90 degree angle from ster

[2] Waxiness: 1 = ABSENT (Glossy) 2 = SLIGHTLY WAXY 3 = WAXY

[1][9] MM. WIDTH (First leaf below flag leaf)

[2][0] CM. LENGTH (First leaf below flag leaf)

[1] Anthocyanin in leaf sheath: 1 = ABSENT 2 = PRESENT

6. HEAD:

[2] Type: 1 = TWO-ROWED 2 = SIX-ROWED

[1] Density: 1 = LAX 2 = ERECT (Not dense) 3 = ERECT (Dense)

[2] Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE 4 = OTHER (Specify) _____

[2] Waxiness: 1 = ABSENT (Glossy) 2 = SLIGHTLY WAXY 3 = WAXY

[2] Lateral Kernels Overlap: 1 = NONE 2 = AT TIP 3 = 1/4 - 1/2 OF HEAD

[3] Rachis *(Hair on edge)*: 1 = LACKING 2 = FEW 3 = COVERED

7. GLUME:

[2] Length: 1 = 1/3 OF LEMMA 2 = 1/2 OF LEMMA 3 = MORE THAN 1/2 OF LEMMA

[3] Hairs: 1 = NONE 2 = SHORT 3 = LONG

[4] Hair covering: 1 = NONE 2 = RESTRICTED TO MIDDLE 3 = CONFINED TO BAND 4 = COMPLETELY COVERED

[3] Awns: 1 = LESS THAN EQUAL TO LENGTH OF GLUMES 2 = EQUAL TO LENGTH OF GLUMES 3 = MORE THAN EQUAL TO LENGTH OF GLUMES

[3] Awn Surface: 1 = SMOOTH 2 = SEMISMOOTH 3 = ROUGH

B1601

8600083

8. LEMMA:

[5] Awn: 1 = AWNLESS 2 = AWNLETS ON CENTRAL ROWS, AWNLESS ON LATERAL ROWS 3 = SHORT ON CENTRAL ROWS, AWNLETS ON LATERAL ROWS 4 = SHORT (less than equal to length of spike) 5 = LONG (longer than spike) 6 = HOODED

[3] Awn Surface: 0 = AWNLESS 1 = SMOOTH 2 = SEMISMOOTH 3 = ROUGH

[3] Teeth: 1 = ABSENT 2 = FEW 3 = NUMEROUS

[1] Hair: 1 = ABSENT 2 = PRESENT

[1] Shape of base: 1 = DEPRESSION 2 = SLIGHT CREASE 3 = TRANSVERSE CREASE

[2] Rachilla Hairs: 1 = SHORT 2 = LONG

9. STIGMA:

[2] Hairs: 1 = FEW 2 = MANY

10. SEED:

[2] Type: 1 = NAKED 2 = COVERED

[1] Hairs on Ventral Furrow: 1 = ABSENT 2 = PRESENT

[3] Length: 1 = SHORT (8.0 mm.) 2 = SHORT TO MIDLONG (7.5 - 9.0 mm.) 3 = MIDLONG (8.5 - 9.5 mm.) 4 = MIDLONG TO LONG (9.0 - 10.5 mm.) 5 = LONG (10.0 mm.)

[3] Wrinkling of hull: 1 = NAKED 2 = SLIGHTLY WRINKLED 3 = SEMIWRINKLED 4 = WRINKLED

[1] Aleurone Color: 1 = COLORLESS (White or Yellow) 2 = BLUE

[0][0] PERCENT ABORTIVE

[4][0] GMS. PER 1000 SEEDS

11. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant) 3=Moderately Susceptible 4=Moderately Resistant

[0] SEPTORIA	[4] NET BLOTCH	[2] SPOT BLOTCH	[0] POWDERY MILDEW
[1] LOOSE SMUT	[0] BACTERIAL BLIGHT	[0] COVERED SMUT	[0] FALSE LOOSE SMUT
[2] STEM RUST	[4] LEAF RUST	[0] SCAB	[0] SCALD
[0] AY	[0] BSMV	[0] BYDV	[__] OTHER (Specify)

12. INSECT: (0 = Not tested, 1 = Susceptible, 2 = Resistant)

[0] GREEN BUG	[0] ENGLISH GRAIN APHID	[0] CHINCH BUG	[0] ARMYWORM
[0] GRASS HOPPERS	[0] CEREAL LEAF BEETTLE	[--] OTHER (Specify) _____	

HESSIAN FLY RACES: [0] GP [0] A [0] B [0] C [0] D [0] E [0] F [0] G

13. CHEMICAL (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] DDT [---] OTHER (Specify) _____

14. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Robust	Seed size	Robust
Leaf size	Robust	Coleoptile elongation	Robust
Leaf color •	Robust	Seedling pigmentation	Robust
Leaf carriage	Robust		

REFERENCES: The following publications may be used as a reference aid for the standardization of character descriptions and terms used in this form:

1. Wiebe, G. A., and D. A. Reid, 1961, Classification of Barley Varieties Grown in the United States and Canada in 1958, Technical Bulletin No. 1224, U.S. Dept. of Agriculture.
2. Reid, D. A., and G. A. Wiebe, 1968, Barley: Origin, Botany, Culture, Winter Hardiness, Genetics, Utilization, Pests, Agriculture Handbook No. 338, U.S. Dept. of Agriculture. pp. 61 - 84.
3. Malting Barley Improvement Association, Milwaukee, Wisconsin, 1971, Barley Variety Dictionary.

COLOR: Nickerson's or any recognized color fan may be used to determine color of the described variety.

EXHIBIT D.

ADDITIONAL DESCRIPTION OF B1601

B1601 is a six-rowed spring barley developed by Busch Agricultural Resources, Inc. It is early in maturity and has excellent malting quality.

B1601 has an erect juvenile growth habit. The spike is lax in density with an erect type head. Lemma awn is long and rough. Rachilla hairs are long as are the rachis hairs. Glumes are completely covered with long hair and the glume awns are more than equal to the length of the glume itself. The aleurone is colorless and the hull is adhering and semi-wrinkled.

B1601 is adapted to the upper midwest spring barley producing area.

EXHIBIT E.

STATEMENT OF THE BASIS OF APPLICANT'S OWNERSHIP

Busch Agricultural Resources, Inc. is the applicant for protection in this case being:

a. The incorporated business registered in Delaware for and within which regular employees have bred B1601.

b. The proprietory owner and intending commercial seller of B1601.

EXHIBIT F

QUALITY DATA B1601

EXHIBIT F - B1601

MALTING QUALITY SUMMARY, 1982-1985

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		Malt %	Wort %	Soluble Protein %			
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